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Alfred François Donné, 1801–1878, discoverer of *Trichomonas vaginalis* and of leukaemia

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Alfred François Donné was born on September 13, 1801, at Noyon (Oise), a small town 40 miles north of Paris. His parents were Adrien Donné, a successful business man in that town, and Marie Anne Gély. He was educated there at the local school and with tutors, and then, at the age of 20, he moved to Paris with his family. Although he had a dislike of law as a career, he embarked on this discipline at his parents' insistence. He qualified as a lawyer but did not practise, and then became a late starter as a medical student, when he entered the Paris Faculty at the Sorbonne at 25 years of age.

We see him to be of normal build and carefully, but not flamboyantly, tailored. His facial features belied his intellectual qualities. He could be a convivial companion, but had a reflective temperament, with a bent for inventive handiwork. He created no little interest and envy among his fellow students by arriving for classes in his own carriage! He was innately a modest man about his successes in later life and indeed his colleagues were astonished when they learned of his unprecedented microscopical observations.

A few years later he married Marie Antoinette Joantho, although very strange to say there seems to be no record of any religious or civil ceremony. Through his wife, he became linked with a well known medical family, the des Essarts. His brother-in-law was the distinguished medical authority, Dr. Sézille des Essarts, who had practised at Donné's home town, and later became Dean of the Faculty of Medicine of Paris. In 1831, Donné graduated at the age of 30, and for his doctorate presented a thesis entitled 'Researches into blood molecules, pus, and mucus, including the humours of the eye'. This painstaking and laborious microscopical work forecast future original researches, which were to place him among the foremost medical pioneers of France of the 19th century. His clinical work was chiefly concentrated at the Charité Hospital, Paris, where he

was fortunate to work under the redoubtable and very experienced clinician Bouillaud, and afterwards became his *chef de clinique*.

His literary qualities were recognized by the University Council and they appointed him to the honorary post of sub-librarian to the Faculty of Medicine. Although every science should be progressive, there was a peculiarly obstructive *bloc* among medical men in the eighteenth and early nineteenth century, who opposed any innovation arising outside the accepted framework of the established system. They produced profound arguments and dissertations in their fight against new inventions and in their refusal to accept the significance of the microscope in Medicine. Why the

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obstructionists persisted in their belittling of this great weapon in our armamentarium was a mystery to Donné, because entomologists and protozoologists had seized on it eagerly and enthusiastically, after Leeuwenhoek's discovery of bacteria almost 200 years previously. Teachers and clinicians in the Medical Faculty of Paris had been impressed by Donné's microscopic revelations in his thesis, and now felt that medical teaching must recognize the potential of the microscope if its message was to be progressively scientific. Donné certainly wished every medical man to realise the instrument's merits. He invented a collapsible microscope which fitted into a coat pocket for the general practitioner and was marketed for £2 in those days!

In 1836, he made one of his greatest contributions to medicine by discovering the protozoon, *Trichomonas vaginalis*, and recorded it in a preliminary publication addressed to the Academy of Sciences, a monograph entitled 'Animalculi observed in purulent fluids and secretions of genital organs from Men and Women' (Donné, 1836). He was not able to state the organism's pathological significance, but he sketched its appearance and size, and also carefully noted that it occurred in a medium which became acidic, although normally alkaline. After advice from a colleague, Professor Dujardin, a Zoologist in Rennes University, he called this protozoon 'Tricomonas' because of its similarities with the Tricodes and Monas. Later, it was given the specific name by which we know it today by Ehrenberg, Professor of Protozoology in Berlin, who gave full credit to Donné for its discovery, and pointed out that its human habitat was vaginal—hence this inclusion in its nomenclature.

In the following year (1837) Donné did further research into purulent urogenital discharges in males and females, for which he suggested new treatment, and examined syphilitic chancres and buboes. It was unfortunate for Donné and others working with bacteria or carrying out other microscopic studies that staining methods were not discovered until 1869, when Hoffman and later Weigert successfully produced staining with carmine and fuchsin.

Donné, however, prudently did not declare a *Vibrio* he found (*Vibrio lineola*) to be the causal organism of syphilis. Bulloch (1938) stated: 'from the micrographs and Donné's descriptions, it is evident that his *Vibrio* was really *S. refringens*'. It is open to doubt whether Bulloch's conclusion represents the truth of the meticulous searching by this protozoologist. However, Donné did not reach or state any definite conclusions on the cause of syphilitic discharges. The medical world had to wait until 1905 for Schaudinn's momentous discovery of *T. pallidum*.

For some considerable time during this period of intensive research, teaching, and clinical work, Donné had realized very vividly that microscopes were invaluable for the proper illustration and understanding of his lectures. In spite of hostility, and obstinate bias, and perhaps jealously, from several alleged friends and colleagues, he organized a microscopy course at his own expense! He installed twenty microscopes with artificial lighting in the amphitheatre of the Lecture Hall and he gave instruction both by day and in the evening—as many of his students took evening classes after their daily occupations.

The clinical lecturers of Paris, both physicians and surgeons, vindicated Donné's fight for recognition of the microscope. In default of action by the Faculty, they met on November 10, 1837, after nomination by the General Council of Paris Hospitals, and strongly pointed out in a report that Donné's important discoveries must be encouraged and emulated with further microscopy in medicine and surgery.

In July, 1839, Louis Daguerre, one of the inventors of photography, presented his discovery to the Academy of Sciences, Paris. Donné became most interested in these remarkably life-like photographic reproductions, and there and then resolved to incorporate these splendid adjuncts into his lectures. It was his method to lecture and to show daguerreotype illustrations; after the lecture the students studied labelled subjects under the microscope. In 1844 he described his procedure in a book entitled 'Cours de Microscopie' which demonstrated the scope of the instrument (Donné, 1844):

(1) 'I often heard spontaneous remarks of commendation of the audience at the sight of these pictures full of life. I am therefore surprised that one takes no advantage of this method of demonstration during lectures; a method so fit to support the zeal and talent of the teacher, to win the attention of the audience, to develop the propensity for studies, and to spread new ideas. As for myself, no sacrifice made me hesitate to use this powerful instrument.'

(2) 'My lectures attended by a great number of French and foreign students contributed to making the importance of the microscope understood and to gaining the interest and confidence it merits. I know what there is still to accomplish in diffusing the knowledge of this instrument in medical practice; to popularize it is essential. By looking back half a score years, and by seeing the progress of this science—it is impossible to lack confidence in its future.'

He may truly be regarded as one of the fathers of visual aid, after such expositions both to scientists

and to the public. There are in existence two photographs of Donné and his wife and children, reproduced here from the faded originals kindly lent by Mme de Vismes who is Dr Donné's last descendant.

During his hospital work, he became concerned about paediatric problems; he constructed a lactoscope to determine the density of milk, and demonstrated to all that milk globules were fat molecules in a state of agglomeration. He also devised a condenser apparatus to preserve milk by a cooling process. His paediatric successes with feeding difficulties of premature infants reached the ears both of the Paris public and of Court circles. The infant son of the Duc d'Orleans, and grandson of King Louis-Philippe, was very seriously ill, on account of his inability to take human or cow's milk. Donné was summoned and after many anxious hours of experimentation with various milks, judiciously prescribed a milk diet which proved almost immediately successful. His clinical successes both in general practice and at his hospitals, and his success with Royalty, led to his election as a Chevalier of the Legion of Honour; a short time later he was made Inspector General of Medicine.

His successful researches into haematology are hardly known, and consequently have not received the publicity and fame they deserve. This fact is well exemplified by his microscopy work in 1839 with leukaemia. Whilst at the *Hôtel Dieu*, Donne's consultative services were requested by Barth and Chomel for a woman patient aged 44 suffering from a painless left-sided abdominal tumour filling the left side of the abdomen. He requested a specimen of blood for examination after being presented with the history and clinical findings, and wrote Barth as follows (Dreyfus, 1957):

'The blood you sent me, my dear colleague, shows a remarkable and most conspicuous change, despite it had been collected in unfavourable conditions, *i.e.* from a dead body. More than half of the cells were mucous globules. This fact perhaps needs some explanation. You know that normal blood contains three types of cells: 1. red cells, the essential cells of the blood; 2. white cells or mucous cells; 3. the small globules. It is the second variety which dominates so much, that, one wonders, knowing nothing about the clinical course, whether this blood does not contain pus. As you know, the pus cells cannot yet be differentiated with definite accuracy from mucous cells.'

In a later case, in one of the lectures in his book 'Cours de Microscopie' (Donné, 1844), he reports far more accurately on leukaemia:

'There are conditions in which white cells seem to be in excess in the blood. I found this fact so many times, it is so evident in certain patients, that I cannot conceive the slightest doubt in this regard. One can find in some

patients such a great number of these cells, that even the least experienced observer is greatly impressed. I had an opportunity of seeing these in a patient under Dr. Rayer at the *Hôpital de la Charité*. This man was affected by arteritis especially in his leg vessels. Both legs showed ecchymoses and gangrenous blisters. The blood of this patient showed such a number of white cells that I thought his blood was mixed with pus, but in the end, I was able to observe a clear-cut difference between these cells, and the white cells.'

Here for the first time in medical history we find leukaemia linked with abnormal blood pathology.

In 1842, he announced his discovery of blood platelets to the Academy of Sciences (Donné, 1842) and these were incorporated in his 'Atlas of Microscopy'.

In 1845, Dr. J. H. Bennett, a graduate of Edinburgh University, reported on a case of hypertrophy of the spleen and liver at the Edinburgh Royal Infirmary. He stressed the fact of having received instruction in clinical microscopy from Dr. Donné in 1841. We can justifiably conclude that this clinical recognition by Bennett was founded on his apprenticeship in microscopy in Paris; and the vivid instruction received there under Donné.

France at this time was passing through a troubled political era. Louis-Philippe had become the titular head of a reactionary government which after a few years of misrule culminated in the '48 Revolution. With the new President, many public and academic appointments were abolished. Donné lost his office of Inspector General, but was later compensated. In 1853, he was recommended and installed as the new Rector of the University of Strasbourg. However, he held this for only a little over one year, and in 1855, he became Rector of the University of Montpellier, one of the oldest teaching centres in the whole of Europe. Here he was eagerly sought as a guest speaker by scientific societies, and became the unanimous choice as President of the Medical Associations. He proved to be a most popular and friendly father figure for students and at reunions of older graduates.

During his stay of almost 20 years at Montpellier he became interested in Pouchet's theories and studies on spontaneous generation. Pasteur and Pouchet were opposing principal figures in this fierce controversy and French scientists were split into two factions. Donné was friendly with Professor Pouchet who was well known and respected in his particular field of natural history. It was not until Pasteur had collected and bacteriologically analysed air collected from Mont Blanc that the great bacteriologist proved his theories—and won over Donné.

On retiring from office at Montpellier in 1875, he returned to Paris, the scene of his earlier triumphs. He remained a quiet unassuming gentleman with a *bon mot* for all his scientific friends and colleagues. He did not stagnate intellectually even in retirement, still enjoying an active part in scientific discussions and ably defending his points of view and expounding his theories in several articles in the *Revue des deux Mondes* and in his much larger work, 'Hygiene des gens du monde'.

He died in Paris of a cerebral vascular accident on March 7, 1878.

It is surely a grave reflection on medical and scientific posterity, that this great figure remains virtually unknown outside France. Indeed, there is no statue of him in the whole of France, yet his contribution to medical and scientific progress is inestimable, and his discoveries must surely gain him an honoured place among contemporary giants like Ehrlich and Pasteur.

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